Creativity of Students' Cultural Product Design Using the SCAMPER Technique

Jong Boonpracha[a*], Jitravadee Roong-in[a], Supatra Lookraks[a],

Palang Wongtanasuporn[a], Suwimon Kooptiwoot[a] and Supit Seangkong[b]

[a]*Faculty of Industrial Technology, Suan Sunandha University, Bangkok, Thailand*
[b]*Faculty of Fine and Applied Art, Burapha University, Chonburi, Thailand*
[*]*Corresponding Author. Email: jong.bo@ssru.ac.th*

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Abstract

SCAMPER is a creative technique used to apply innovative ideas; however, few studies have investigated its role in developing creative ideas for cultural product design. The present study aimed to assess the creativity of a group of Thai product design students in using the SCAMPER technique. The research was conducted at Suan Sunandha Rajabhat University in Bangkok, Thailand, with 25 third-year students aged 19-21 participating in an eight-week study. Students were instructed on how to use the SCAMPER technique to come up with creative ideas, and their creativity was measured by four factors: fluency, flexibility, originality, and elaboration. Three product design experts with at least five years of experience in creative cultural product design served as evaluators. According to the findings, the technique contributed greatly to the students generating creative ideas in cultural product design.

Keywords: creativity, SCAMPER technique, cultural product design, design activity

Introduction

Creative learning is founded on the idea of giving students the opportunity to develop their learning cognition by enriching their perspectives through the principle of knowledge acquisition (Julier, 2014). In this sense, design activities allow students to improve their capacity to communicate creative ideas using diverse presentation

strategies, such as sketches and models. Sketching is a technique for expressing knowledge and clarifying concepts. Technical sketches and models can be seen as visual representations of the knowledge gathered during the creative process (Martin, 2017). As new knowledge is obtained, sketches and models can be developed and adjusted in the context of student interaction (Buxton, 2007). Other modes of experience where creative ideas can be imagined without the use of real things, should also be considered (Morris, 2016). Sketches include knowledge that cannot be conveyed in words and can lead to a design communication strategy, allowing for engagement during the design process. Consequently, design activities are commonly labeled as idea-creation activities because they help students become creative design thinkers as individuals or groups (Barlex, 2006).

Creativity is vital for students specializing in design to increase their proficiency in their area (Morris, 2016). Students develop design concepts by combining numerous ideas to tackle challenges (Potter, 2002). However, coming up with useful ideas in a short amount of time is difficult. As a result, the study found that generating ideas by writing down a list of topics was more effective than precisely constructing the questions and verifying them one by one with a checklist. Therefore, the study conducted design activity for cultural product design using the checklist questions of the SCAMPER technique and then verified the creative effectiveness. The purpose of this study was to apply it to design activities to guide the students' creativity and to verify the effectiveness of idea generation through the SCAMPER technique. Thus, the study asked: How does the SCAMPER technique affect students' ability to create original ideas in cultural product design?

Creativity and the SCAMPER Technique

The Concept of Creativity

Creativity is defined as the mental and social process of discovering new concepts or ideas or recombining old ones (Gerstenfeld, 1999). According to psychologists, creativity is the ability to think innovatively;

originality, fluency, flexibility, and complexity are all characteristics of creativity (Kelley and Littman, 2005). A tradition of thinking regards creativity as a mental attitude and personal characteristic. In this scenario, sensitivity, openness, inquiry, and independence are all considered variables. From a sociological standpoint, it is suggested that society, not individuals, influences the variables of creativity. According to philosophers, each individual's uniqueness is ultimately what determines creativity. It is argued that the unique basic is the original force that reveals creativity because humans are essentially distinctive. According to Lowenfeld (1993), who established the concept of creativity through art education, the most important aspect of art is creativity, and the components of creative thinking – fluency, flexibility, originality, and elaboration – are as follows. Fluency is the capacity to generate a large number of ideas in a short period of time by thinking freely and rapidly. In other words, the quantitative ability to provide a variety of responses and ideas to a given situation is utilized primarily in the initial stages of thought. Flexibility refers to the ability to come up with a solution using flexible thinking by departing from established ideas, thoughts, and ways of thinking, and rapidly changing one's way of thinking in a new situation. Thus, novel ideas are generated in response to unforeseen obstacles. Originality is the capacity to generate novel ideas that are difficult for others to conceive by escaping the current framework. And elaboration is the capacity to produce elaborate design details or descriptions that explain a novel and specific solution to a problem.

The SCAMPER Technique

The concept of idea generation, as well as the various approaches and processes for idea generation described above, are all linked to various techniques for producing creative ideas. Brainstorming, analogical thinking, lateral thinking, idea checklists, mind mapping, and the SCAMPER technique are all examples of non-predefined answers or solution creation techniques. The keywords in the seven questions of SCAMPER are an abbreviation of a series of memorable and interesting cognitive processes: substitute, combine, adapt, modify, magnify,

minimize, put to other use, eliminate, reverse, and rearrange. SCAMPER was first proposed by Alex Faickney Osborn, author of the brainstorming technique, and was further developed by Bob Eberle, an education administrator and author. Unlike brainstorming or mind maps, which expand ideas through associations that generate various ideas that come naturally to the mind, the SCAMPER technique is an artificial idea method that allows users to deviate from general logic and come up with creative and diverse ideas according to a checklist. It is a method of generating ideas by presenting conceivable problems for each item ahead of time and checking them one by one, rather than generating an idea distantly by creating questions with the starting point of problem-solving to generate ideas. According to McKilligan (2011), using a checklist when solving a problem allows users to easily approach the problem they had vaguely thought of and ensures that important details are not underestimated. This way of thinking is useful for spreading ideas through a checklist and generating ideas when nothing comes to mind during the design process (Brownell, 2006). There are various idea diffusion techniques, but with the SCAMPER technique, users can use it in any order they prefer. If necessary, users can ask one question at a time or multiple questions at once. Table 1 lists each SCAMPER process with the corresponding questions.

Table 1 Table of Questions for the SCAMPER Technique

SCAMPER	Questions for the SCAMPER technique
(S) Substitute	- What materials or resources can you substitute or swap to improve the product? - Is it possible to utilize this product as a replacement for something else? - What happens if your feelings or attitude regarding this product change?
(C) Combine	- What if you combined one product with another to make something entirely unique? - What if you combine goals or purposes? - How could you bring together resources to come up with a fresh approach to a product?

Table 1 Table of Questions for the SCAMPER Technique (cont.)

SCAMPER	Questions for the SCAMPER technique
(A) Adapt	- How could you repurpose this product for a different use or application? - What other scenarios could the product be used in? - What other ideas do you have that you could utilize as inspiration?
(M) Modify Magnify Minify	- What if you could alter the shape or appearance of your product? - What could you highlight or accentuate to add greater value? - What aspect of this product could you improve to make it better?
(P) Put to other uses	- Is it possible to apply this product in a different sector? - How might this product behave in a different situation? - Could the waste from this product be recycled to create something new?
(E) Eliminate	- What are some ideas you could cut or simplify in this product? - What components, features, or procedures might you get rid of? - What if you took away a portion of this product? What would you replace it with?
(R) Reverse, Rearrange	- What if you reversed the process or rearranged the steps in a different order? - What components could you replace to change the product's order? - What are some alternatives you could use to restructure this product?

Cultural Product Design

Cultural product design is an alternative approach to consumer product design. The relationship between culture and product design is becoming increasingly evident. The pertinent literature about cultural product design has been enthusiastic and provides specific arguments for why culturally relevant designs should be a major focus (Busch, 2002). The relationship between design and culture has evolved over time since design is now regarded as a reflection and precursor of change (Julier, 2014). Previous research revealed that variations in the adaptability of the culture influence and characterize progress in the design. The design simultaneously transforms and defines culture (Chen, 2018). For example, cultural ideas and local behaviors develop and promote frames of meaning that establish the specific norms of a product's purpose. Certain cultural contexts determine whether individuals utilize a

particular product. In addition, culture imparts product meaning, generates rituals in which products are employed, and manifests values frequently reflected in the shape and function of products (Bryman, 2001). Consequently, design is associated with culture through the incorporation of cultural values in products. In addition, cultural values provide designers with rich and diverse sets of resources that inspire novel design concepts (Chong, 2004), which constitute a technique for identifying linkages between users' customs. Thus, the study used SCAMPER techniques to generate creative ideas and solve problems in the cultural product design process by inspecting each item one by one instead of generically solving numerous problems that emerge during the design process.

Research Methods

The study utilized components of the design process of Middleton (2005) and a portion of the model of Ingerman and Collier-Reed (2011) to investigate the creativity of students' idea generation in product design using the SCAMPER technique. The approach for analyzing knowledge and comprehension in the design activity includes a procedure for examining competency in creative idea generation during the design activity.

The study was conducted at Suan Sunandha Rajabhat University in Bangkok with 25 third-year students aged 19-21, who participated in eight weeks of applying SCAMPER in working on the design process for cultural products. The design activity assignment required students to sketch and create a 1:1 scale drawing and model. Students applied theoretical inputs to the design process in the domain of arts and culture designing cultural products employing SCAMPER approaches.

The study introduced cultural product design and recruited students with pragmatic and theoretical skills that can be used to develop procedural, conceptual, and perspective technical sketches. The students were able to procreate solutions and link information from diverse subjects through the use of conceptual sketches, which show links and

relationships between items (Wakefield, 2017). Integrating procedural and conceptual knowledge into carefully planned design tasks provides students with the opportunity to comprehend the arts and culture for cultural product design processes (Cross, 1999). For cultural product designs with SCAMPER approaches, students were inspired by learning the concepts and examples of creative cultural product design, and they were instructed on how to generate creative ideas.

Arts and culture are founded on the concept of providing students with opportunities to enhance their cultural product design through the design process. In this approach, design activity provides students with the opportunity to strengthen their capacity to communicate creative ideas through sketches and models using SCAMPER techniques. Sketching is a means for conveying information and describing and clarifying an idea, and models can be considered as tangible evidence of the design process-gained understanding. In the interaction among students, it was possible to construct and modify sketches and models while concurrently acquiring additional knowledge. However, alternative forms of experience, such as drawing, where creative ideas can be seen without the use of real things, should be considered. Sketches contain information that cannot be represented in words and can lead to an approach in design communication, hence facilitating involvement during the design process. As a result, the design activity usually consists of creative problem-solving activities since they stimulate students' cognition and inspire them to become creative cultural product designers as individuals or in groups. In this study, the design activity had the seven steps described below.

- Step 1 SCAMPER and Product Design Introduction: Students learned about SCAMPER techniques, cultural product design concepts and examples, as well as creative idea creation.
- Step 2 Conceptual Design: Students planned a conceptual design inspired by arts and culture and focused on the form and function of cultural product design.

- Step 3 Idea Sketching: Students sketched as many ideas as practicable in accordance with the conceptual design using SCAMPER techniques.
- Step 4 Idea Development: Students selected the most suitable of three to five idea sketches and developed each of them with a clearer and more detailed approach.
- Step 5 Study Model Making: Students considered the best idea of idea development to transform it as a study model.
- Step 6 Physical model making: Students developed and improved a study model to demonstrate the detailed aspects and functions of the finalized product in a physical model.
- Step 7 Presentation: Students presented creative ideas to generate cultural product design applying the SCAMPER technique.

To evaluate students' creativity effectiveness, three product design experts analyzed the creativity of students' cultural product design using the SCAMPER technique. The assessment topic was based on Lowenfeld's theory of creativity, which included four issues: fluency, flexibility, originality, and elaboration, which corresponded to the four steps of this study's design activity: idea sketching, idea development, study model making, and physical model making. Lowenfeld's creativity theory and design activity are consistent, as shown in Figure 1.

- Fluency in generating a large number of ideas in a short period of time by thinking quickly and freely to solve a problem primarily in the initial phases of thought corresponds to the ability of idea sketching to generate as many alternate ideas as possible to solve a problem that requires a novel solution by emphasizing rapid idea formation over design aesthetics.
- Flexibility in generating a wide variety of ideas to solve a problem that requires a novel solution corresponds to the ability of idea development to develop an idea sketch by choosing a possible idea to solve a required problem in a varied range of solutions with a clearer, and more detailed approach.
- Originality in coming up with new ideas that are difficult for others to think of by breaking out of the present framework corresponds to the ability of study model making to convincingly communicate creative design ideas for initial evaluation of aesthetic considerations and innovative design.
- Elaboration in generating elaborate details or descriptions that explain a specific and novel solution to a problem corresponds to the ability of physical model making to illustrate and demonstrate the qualities and functionalities of cultural product design to examine a distinct and unique solution to a problem.

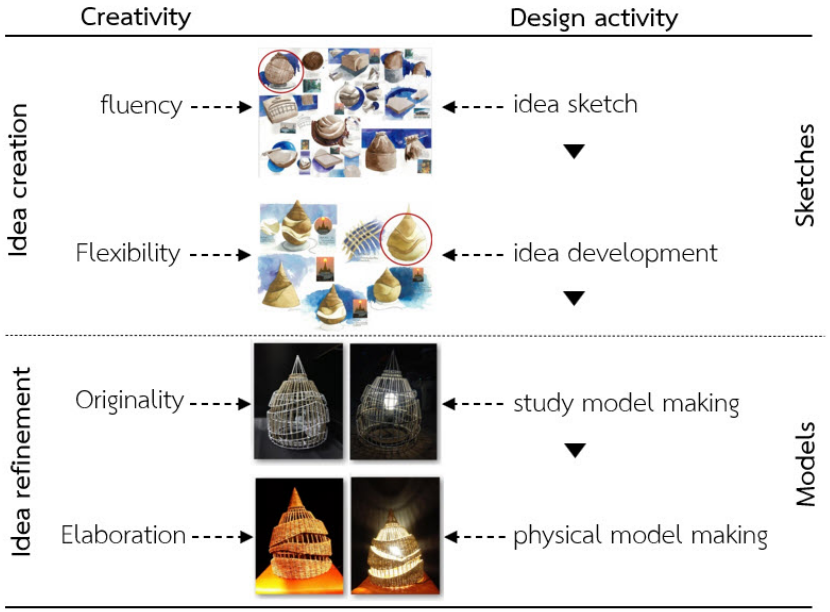


Figure 1 The correspondence of Lowenfeld's creativity theory and design activity
Source: Author

Results

Through the design activities, students applied the SCAMPER technique. Creative idea creation was explored and embodied through design activity of steps 3-6: idea sketching, idea development, study model making, and physical model making. The results of seven creative cultural product designs were represented to investigate the creativity of students' cultural product design using the SCAMPER technique. The results are shown in Tables 2-8.

Table 2 Student's creative idea using the Substitute Technique

Inspiration	Questions	Result
 Wat Phra Kaew *Yaksa* guardian (guardian giant) sculpture at the Temple of the Emerald Buddha.	What aspect of the identity of the giant is it, and what component is it?	 The head is the part that most clearly identifies the giant. In addition, the baton clarifies the definition of protection as a secondary component. The substitute technique is used to create the giant's head, with light and shadow forming the giant's face. With this idea, it could be a wall lamp product for the exterior of the home.

Table 3 Student's creative idea using the Combine Technique

Inspiration	Questions	Result
 Wat Phra Kaew *Yaksa* guardian giant) sculpture at the Temple of the Emerald Buddha.	What else is the relevance of each of the giant's unique colors? How can these two elements be combined to create a design?	 The colors of the five elements linked with auspicious meaning in *feng shui* and the five colors of giants are identical. Therefore, designing packaging for five-color honey soap with graphics of giant faces adds value of cultural products including its auspicious meaning.

Table 4 Student's creative idea using the Adapt Technique

Inspiration	Questions	Result
 Wat Saket (Phukhao Thong Golden Mountain)	What unique shape or characteristic of Wat Saket will be adapted into the design of a culturally-inspired product? And how could the beauty and grace of Wat Saket be adjusted into a product?	 The golden glow of the temple gives the stupa the visual effect of floating in the air. Considering these factors, the student deemed the lamp's design most suitable for a cultural product with a weave pattern including light, airy openings generated by alternatingly greater and less airy spacing.

Table 5 Student's creative idea using the Modify Technique

Inspiration	Questions	Result
 Sao Ching Cha (Giant Swing)	What unique shape or characteristic of Sao Ching Cha will be modified into the design of a culturally-inspired product?	 Sao Ching Cha owes its distinctive appearance to two enormous red wooden pillars topped with a crown-like top. However, the height and details of the pattern on the column must be modified to meet the shape of an aroma lamp product that has a form of flame swaying to the right.

Table 6 Student's creative idea using the Put to Other Use Technique

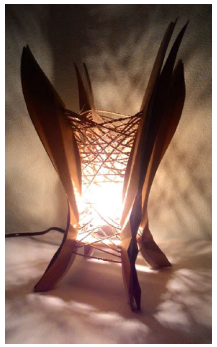
Inspiration	Questions	Result
 *Talipot* fan	How can the flat bodhi shape of the *talipot* fan be used to design three-dimensional shapes?	 The design utilized a random overlapping weave to connect the parts, resulting in a lamp resembling a bird's nest hollow covered by leaves. This creative thinking activity transformed the flat shape into another useful three-dimensional function.

Table 7 Student's creative idea using the Eliminate Technique

Inspiration	Questions	Result
 Loha Prasat (Iron Palace or Iron Monastery) in Wat Ratchanatdaram, Bangkok, Thailand	Is there a way to design a suitable height for the product while retaining the concept of the Loha Prasat's elegant form and striking height?	 The product is designed to be an aromatherapy lamp with a hole that allows fumes to escape from a small slit on the side, resembling clouds floating beneath the peak. Therefore, the top of the aromatherapy lamp was cut off and triangle-shaped holes were punched into the lamp's sides to allow aromic fumes to disperse.

Table 8 Student's creative idea using the Rearrange Technique

Inspiration	Questions	Result
 *Benjarong* - Thai porcelain designs originally consisted of five colors, but nowadays more than five colors are used, as well as gold, silver, or metallic.	How can the beautiful and elegant pattern of *Benjarong* be designed into a simple pattern with greater freedom?	 The student meticulously selected elements from the *Benjarong* pattern to design the patterns on the lamp's base, allowing areas of colored space to contrast with the pattern to accentuate its prominence. Regarding the lampshade, only the fundamental portion of the pattern has been independently rearranged with alternating large and small elements.

To assess the creativity of students' cultural product design using the SCAMPER technique, the study investigated seven works of the students based on fluency, flexibility, originality, and elaboration, which corresponded to the four steps of design activity including idea sketches, idea development, study model making, and physical model making. Three product design experts with at least five years of experience in creative cultural product design served as evaluators. On a Likert scale ranging from 1 (not at all creative) to 5 (highly creative), the experts were asked to rate the creativity of ideas using each SCAMPER technique on cultural product design.

The evaluation of the creativity of students' works using the SCAMPER technique demonstrated in Table 2 indicates that the student works were deemed to be highly creative and the results of the students who utilized the Substitute and Eliminate Technique were considered to be the most creative. The most creative of fluency was the student's use of the Combine and Modify Techniques. The student who implemented the Rearrange Technique generated the most creative example of flexibility. The student whose work utilized the Put to Other Use Technique exhibited the highest level of originality. Additionally, students who utilized the Substitute and Eliminate techniques excelled the most in elaboration.

Table 9 The result of the creativity of students' cultural product design using the SCAMPER technique

SCAMPER technique	Fluency	Flexibility	Originality	Elaboration	$\bar{X}$	SD	Interpretation
Substitute	4.17	4.17	4.50	4.67	4.38	.22	highly creative
Combine	4.50	4.17	3.67	3.50	3.96	.43	highly creative
Adapt	3.83	4.00	4.50	4.50	4.21	.30	highly creative
Modify	4.50	4.00	4.33	4.00	4.21	.22	highly creative
Put to other use	3.83	4.00	4.83	4.67	4.33	.43	highly creative
Eliminate	4.17	4.17	4.67	4.50	4.38	.22	highly creative
Rearrange	4.00	4.67	4.00	4.50	4.29	.30	highly creative

Discussion

The creativity of student work using the SCAMPER technique through design activity was developed to guide the creative thinking of students studying cultural product design. The study findings on the creative effectiveness of cultural product design reveal varying degrees of effectiveness for each SCAMPER technique. The most effective techniques for fluency were the Combine and Modify techniques, while the most effective technique for flexibility was the Rearrange technique. Although the Eliminate technique was not the most effective in terms of fluency, flexibility, originality, and elaboration, it was the most effective outcome of the SCAMPER technique for generating creative ideas. As it is based on the study of a single student group, conclusions are limited to this study. According to the researchers, the performance excellence of each technique depends on the appropriate application of design for innovative efficacy.

In this study, the creative thinking components of fluency, flexibility, originality, and elaboration correspond to the design tasks of idea sketching, idea development, study model making, and physical model making. Therefore, not just one or two components of creative thinking or one step of the design activity will result in a creative cultural product; rather, all components and processes of the design activity are necessary (McKilligan, 2011). In the process of generating creative ideas for the cultural product design, the first step in establishing creativity fluency is to generate as many creative ideas as quickly as possible, followed by a consideration of the three to five of the most appropriate and relevant ideas that match the objective, or possibly more depending on their suitability. The next step is to develop three to five concepts whose resolution demands additional time and effort. Then, every aspect of the work should be investigated using experimentation or modeling to determine the ideal approach. Finally, opportunities and achievements are apparent assuming that all achievements have accomplished their intended purpose. Therefore, the final step will consist of the implementation of the task and the refinement of design function specifics.

Each SCAMPER technique is generally effective in terms of design innovation and is one of the methods that aid in the development of creative thinking. SCAMPER also incorporates other disciplines or even general lifestyle concerns, such as the study of creativity in the context of COVID (Elisondo, 2022) or certain world events that can be characterized using SCAMPER techniques (Toraman, 2013). For example, "recycle" is an illustration of the Put to Other Use technique, and "disruption" is an illustration of the Substitute technique. Such examples demonstrate that SCAMPER is a comprehensive and creative method for generating a variety of inventive ideas.

Conclusion

There are numerous strategies for generating ideas, but few of them are readily accessible and engaging to students. In particular, there is a need for a method to foster creative thinking in cultural product design students. Consequently, the purpose of this study was to conduct design activities using the SCAMPER technique to assist students in cultural product design ideation and to assess the effectiveness of their creativity. The results indicate that these activities prompted students to demonstrate and communicate innovative concepts for cultural product design. Many students in these contexts are capable of incorporating their creative ideas into cultural product design and employing them to remedy the discovered challenges. As a result, the majority of students attained knowledge of cultural product design, enabling them to estimate how they could apply their newly-acquired creative capacity to design work. In conclusion, the students employed creative ideas using SCAMPER on cultural products through a design activity that supported and strengthened the rationale of the relationship between arts and culture and cultural products. In addition, the study indicates that students were able to generate creative ideas through a carefully planned design activity that combined conceptual input and discussion with the practical SCAMPER technique. It can contribute to the integration of culture into contemporary products. SCAMPER can also provide students with a valuable resource for incorporating Thai cultural aspects into contemporary product design, provided that these cultural products have the potential to generate economic and cultural value.

References

Barlex, D. (2006). Pedagogy to promote reflection and understanding in school technology courses. In J. Dakers (Ed.), **Defining technological literacy. Towards an epistemological framework.** (pp. 179-196). New York: Palgrave Macmillan.

Brownell, B. (2006). **Transmaterial: A catalog of materials that redefine our physical environment.** Hudson, NY: Princeton Architectural Press.

Bryman, A. (2001). **Social research methods.** New York: Oxford University Press.

Busch, A. (2002). **Design is: Words, things, people, buildings, and places.** Hudson, NY: Princeton Architectural Press.

Buxton, B. (2007). **Sketching user experiences: Getting the design right and the right design.** Elsevier.

Chen, C. W. (2018). New product styles and concepts in the bicultural context. **The Design Journal: An International Journal for All Aspects of Design, 21**(6), 771-787.

Chong, M. (2004). **Designing the user experience for international web users.** West Yorkshire: Emerald Group Publishing Limited.

Cross, N. (1999). Natural intelligence in design. **Design Studies, 20**(1), 25-39.

Elisondo, R. C. (2022). Creative processes and emotions in COVID-19 pandemic. **Creativity Studies, 15**(2), 389-405.

Gerstenfeld, N. (1999). **When things start to think**. New York: Hodder & Stoughton.

Ingerman, A. and Collier-Reed, B. (2011). Technological literacy reconsidered: A model for enactment. **International Journal of Technology and Design Education**, **21**, 137-148.

Julier, G. (2014). **The culture of design**. (3rd. ed). London: Sage.

Kelley, T. and Littman, J. (2005). **The ten faces of innovation: IDEO's strategies for beating the devil's advocate & driving creativity throughout your organization.** New York: Currency/Doubleday.

Lowenfeld, V. (1993). **Art education for humans.** Carbondale, IL: Southern Illinois University Press.

Martin, A. (2017). **Visual knowledge for multimodal learning.** Skane Lan: Studentlitteratur.

McKilligan, S. (2011). Creativity through design heuristics: A case study of expert product design. **Design Studies, 32**(4), 384-415.

Middleton, Howard. (2005). Creative thinking, values and design and technology education. **International Journal of Technology and Design Education, 15**, 61-71.

Morris, R. (2016). **The fundamentals of product design**. London: Bloomsbury Publishing.

Potter, N. (2002). **What is a designer: Things, places, messages.** London: Hyphen Press.

Toraman, S. (2013). Application of the six thinking hats and SCAMPER techniques on the 7th grade course unit, "Human and Environment:" An exemplary case study. **Mevlana International Journal of Education, 3**(4), 166-18.

Website

Wakefield, J. (2017). **TED Global: Africa needs more engineers and makers. BBC News**. Retrieved December 15, 2021 from https://www.bbc.com/news/technology-41080479